2015

Current perspectives on humanitarian hearing healthcare: A survey of U.S. audiologists

Rachael Marie Kingma Queen
Washington University School of Medicine in St. Louis

CURRENT PERSPECTIVES ON HUMANITARIAN HEARING HEALTHCARE: A SURVEY OF U.S. AUDIOLOGISTS

by

Rachael Marie Kingma Queen

A Capstone Project
submitted in partial fulfillment of the
requirements for the degree of:

Doctor of Audiology

Washington University School of Medicine
Program in Audiology and Communication Sciences

May 20, 2016

Approved by:
Kay Park, Au.D., and L. Maureen Valente, Ph.D., Capstone Project Advisors
Andrew Schuette, Au.D., Secondary Reader

Abstract: *A national survey of U.S. audiologists examines the level of participation of U.S. audiologists in humanitarian audiology efforts, characteristics of U.S. humanitarian audiology trips, barriers preventing U.S. audiologists from volunteering internationally, factors related to increased humanitarian audiology participation, and topics within humanitarian audiology needing further investigation and research.*

ACKNOWLEDGEMENTS

I would like to thank my Capstone advisors, Kay Park, Au.D., and L. Maureen Valente, Ph.D., and secondary reader, Andrew Schuette, Au.D., for embracing my unconventional Capstone Project. Surveying the efforts of U.S. humanitarian audiologists required the exploration of uncharted waters, but the voyage was well worth its journey. I am humbled by the selfless partnership you provided throughout every stage of the study.

Thank you to Dorina Kallogjeri, MD, MPH, for volunteering your time to perform the statistical analysis and interpretation of survey results. Your immediate belief in my project's undertaking is a cherished compliment, and your insight to my research findings an invaluable asset.

Thank you to Beth Fisher for leading me through the 'tumultuous passage' of the Institutional Review Board. With your savvy and speedy assistance, my Capstone survey was accepted and distributed with few obstacles.

Thank you to my parents for giving me the gift of a Christian education. This led to my life-transforming mission trip to the Jamaican Christian School for the Deaf and my confidence in an omniscient God.

The biggest thank you to my husband, Kevin, for enduring my graduate school career. You taught me to be a woman and wife of unwavering faith. Let's start exploring the world!

Finally, I would like to dedicate this project to my Creator, the mastermind behind my presence in this profession, and to the little Jamaican boy who has given me recurrent motivation and determination to fulfill my doctorate of Audiology. Dwayne, you hold a special place in my heart and are the face that illuminates my professional endeavors.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

ABBREVIATIONS

AA = Academy of Audiology

AAA = American Academy of Audiology

EHDI = Early Hearing Detection and Intervention

GNI = Gross National Income

IRB = Institutional Review Board

LMIC = Low- and middle-income countries

MDGs = Millennium Development Goals

NGO = Non-government organizations

OM = Otitis media

PAC = Political Action Committee

SLP = Speech-language pathology

SNHL = Sensorineural hearing loss

UDHR = Universal Declaration of Human Rights

UN = United Nations

U.S. = United States

WHO = World Health Organization

INTRODUCTION

According to the World Health Organization (WHO) (2008), hearing loss is the most prevalent disabling condition and one of the major contributors to the global burden of disease. WHO (2015) estimates that 5.3% of the world population or 360 million people live with a 'disabling hearing loss' (permanent unaided hearing loss averaged over frequencies of 500, 1000, 2000, and 4000 Hz of >40 dB HL in the better hearing ear for adults; >30 dB HL in the better hearing ear for children) (2014). This population is comprised of 328 million adults (56% males, 44% females) and 32 million children (77% <15 years, 23% <5 years). Hearing loss is caused by a variety of factors including genetic disorders, complications during pregnancy or at birth (e.g., maternal rubella, cytomegalovirus, toxoplasmosis, hyperbilirubinemia), certain acquired infectious diseases (e.g., chronic ear infections, measles, mumps, human immunodeficiency virus (HIV)), pharmacologic agents (e.g. aminoglycosides, antineoplastics, antimalarial drugs, diuretics, salicylates), head trauma, exposure to excessive noise levels and ageing (WHO, 2014).

Permanent, congenital sensorineural hearing loss (SNHL) in the United States (U.S.) occurs at a rate of 3 out of every 1000 births, with 50% of cases being genetic (70% non-syndromic, 30% syndromic), 25% environmental, and 25% idiopathic (Centers for Disease Control and Prevention, 2014). A study by Swanepoel and Storbeck (2008) showed the same prevalence of hearing loss amongst South Africa's middle to upper class as the U.S., but noted a doubling in the prevalence of hearing loss in the lower class, which comprises a majority (80%) of the population. The socioeconomic status of individuals in South Africa determines the type and quality of medical resources and treatment received. Middle and upper class citizens receive highly specialized and sophisticated medical services through privately funded agencies while lower class citizens receive publicly-funded healthcare services that are poorly managed and

chronically underfunded (South Africa, 2012). Though South Africa is considered to be an emerging market economy, the disparity in hearing impairment across its socioeconomic divisions demonstrates the disproportion of disease within an economy. In addition to dramatic differences of disease rate within the same country, there are significant differences between countries as well. WHO estimates that the incidence of permanent congenital or early-onset hearing loss in developing countries occurs at a rate of six cases per 1000 live births, compared to two to three cases per 1000 live births in developed countries (Tucci, Merson, &Wilson, 2010).

Currently, two-thirds of adults and children with bilateral moderate to profound hearing impairment live in low- and middle-income countries (LMIC) where individuals, on average, make less than $12,746 annually (gross national income (GNI) per capita). (Smith, 2008; World Bank Group [WBG], 2014). The prevalence of disabling hearing loss in adults and children within the South Asia, Asia Pacific and Sub-Saharan Africa regions is nearly double as compared to high-income countries (earning $12,746 or more GNI per capita) (WBG, 2014; WHO, 2012b). The ranking is estimated by GNI, since "low GNI is an indicator of widespread poverty, inequality, and unemployment/underemployment" (McPherson, 2008). As GNI and adult literacy rate increase, the prevalence of disabling hearing loss in children exponentially decreases (WHO, 2014).

Developing countries are quantified by income, economic and social structure, or social and physical quality of life measures. For the purposes of this Capstone Project, developing countries will be defined as "low average annual income [countries] whose economies are mostly dependent on agriculture and primary resources and which do not have a strong industrial base" (McPherson, 2008). Developing countries are found in Africa, Asia, the Middle East, Latin

America, and the Pacific, but depending on inclusion criteria may also include countries within Eastern Europe and the former Soviet Union (p. 7).

In developing countries, the leading cause of hearing loss is chronic otitis media (OM) with effusion (Smith & Mathers, 2006). Though a regularly treated infection in the U.S., "90% of the global burden of chronic ear infections is borne by countries in the South-East Asia, Western Pacific and African Regions, and ethnic minorities in the Pacific Rim" (WHO, 2014). These regions have inaccessible healthcare services that force their citizens to suffer needlessly as public health and the delivery of comprehensive hearing healthcare services, such as early identification and medical intervention, can prevent nearly half the world's afflicted hearing loss (Goulios & Patuzzi, 2008; WHO, 2014).

Unidentified or untreated hearing loss at any age is a significant burden to both individuals and societies (Smith, 2008). For those with congenital or early-onset hearing loss, normal speech and language development is impeded and can prevent a child from attaining his or her fullest potential as a student and future contributing citizen of a communication-based economy (Ruben, 2000). Hearing impairment prior to language development causes irreversible damage in the temporal lobe, which houses the language centers of the brain and subsequently produces permanent alterations in psychosocial health and cognitive processing (Smith, 2008). Therefore, children with little to no listening and spoken communication skills are set on a trajectory of limited educational and vocational attainment (Olusanya, Neumann, & Saunders, 2014). An overview of studies concerning children with disabilities have also examined that "children with hearing impairment may be at increased risk of physical, social, emotional and sexual abuse and even murder" (Olusanya et al., 2014; Jones et al., 2012). To promote emersion of speech and language and optimal personal development, early identification, auditory

stimulation (acoustic and/or electric) and specialized family and patient intervention resources are required during the critical period of a child's explosive language growth.

Early studies revealed the majority of deaf high school students without listening and spoken language skills had the reading and writing ability of a third or fourth grade student. Few deaf students ever exceeded a 7.5 grade reading level (Allen, 1986; Trybus & Krachmer, 1977). However, more recent studies report that children whose hearing losses were identified by 6 months of age and received intervention services within 2 months of identification demonstrated significantly better receptive and expressive language development than their later-identified deaf and hard-of-hearing peers (Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). These results were found to be independent of socioeconomic status, but behavioral research shows children living in poverty, in and outside of the U.S., are at a severe disadvantage when learning language.

When impoverished children are in the critical period for learning language, environment restrictions and chronic stress impede language acquisition and overall brain development (Voss & Lenihan, 2014). If hearing loss is combined with the high stakes of poverty, early hearing detection and intervention (EHDI) programs become even more important in the facilitation of listening and spoken language. In addition, the characteristic of 'resilience' also becomes key when providing hearing services for impoverished families managing hearing loss (Voss & Lenihan, 2014). A prevailing willpower and determination to succeed in spite of one's environment (resilience) can be fostered through family-centered services that are provided before and during the early years of an infant's life. The services should focus on professional 'coaching', which encourages the 'coming alongside' and 'meeting of' people in their current life circumstances to promote maximal opportunity for success. If families managing hearing

loss who are also living poverty are given this form of support, the futures of their children may be much brighter (Voss & Lenihan, 2014).

Even into adulthood, the detriments imposed by disabling hearing loss can negatively impact one's sense of self and quality of life. (Helvik, Jacobson, & Hallberg, 2006). Deterioration of psychosocial wellbeing reportedly arises from relationship strain, social isolation, activity restriction, feelings of loneliness and/or abandonment, embarrassment, stigmatization, occupational limitations, financial dependence, increased listening effort, reduced cognitive resources for speech comprehension, and high levels of stress, anxiety, frustration and depression (Helvik et al., 2006; Gosselin & Gagné 2010). In a hearing world, academic achievement and interpersonal communication skills are essential for unobstructed participation and success in higher-level education and the professional workforce. The challenge of gaining employment with hearing impairment is only magnified by living in a developing country as literacy levels are much lower and spoken language is central to cultural participation (Swanepoel et al., 2010).

In low-income economies, hearing loss is "a disability that puts and keeps people in poverty" (Wilson, 2013). Hearing loss affects social and economic development in poor communities and countries through increased unemployment rates and increased utilization of special education and (re)habilitation services from financially drained and overly-burdened government systems (Smith, 2008). Poor communities and countries foster hearing loss by exposing citizens to higher rates of hearing loss risk factors, such as unhygienic living conditions, disease outbreaks, inaccessible healthcare, and inadequate knowledge about disease prevention (Olusanya, Ruben, & Parving, 2006). By improving overall health conditions, as proposed by the United Nation's Development Programme in 2000, the incidence of hearing loss

in developing countries may be substantially reduced. Interventions focused on eradicating global poverty, hunger, and combatting life-threatening illnesses can lower the rate of acquired hearing impairment, either through decreased infections or reduced ototoxic treatments (Olusanya et al., 2014).

Mohr et al. (2000) examined the role of communication disorders in individual earnings and their cost to society. The average societal cost of an individual with severe to profound hearing loss is $297,000 (p. 1129). If children with severe to profound hearing loss use special education resources, such as self-contained classrooms, speech-language therapy and/or sign language interpreters, societal costs increase by 21%. The personal expenses accrued by individuals with severe to profound hearing loss acquired after language development (post-lingual) were estimated to be about $43,000, while individuals with profound hearing loss acquired before language development (pre-lingual) are expected to exceed $1 million. Individuals with post-lingual severe to profound hearing loss are expected to earn only 50-70% of the salary of normal hearing peers. Though these findings show increased costs to individuals with hearing loss, early identification and intervention can reduce the financial burden. For example, Harris, Anderson, & Novak. (1995) found a mean increase of $1249 in yearly income in adults three years after cochlear implantation activation for those who had successful aural rehabilitation. This finding demonstrates the positive effects of hearing and speech services in increasing the financial independence and reducing the societal cost of hearing loss.

Governmental support and funding for EHDI programs and adult rehabilitation in the U.S. has been cost-effective due to reduced societal costs as a result of early identification and treatment of hearing loss and communication disorders. It has been suggested that developing countries take the same approach for public funding of early intervention programs. However,

without special consideration of the health expenditure priorities of developing countries, it is easy to apply a formulated approach. Due to high prevalence of disease in developing countries, governmental funds are often not available for early intervention as they are exhausted through treatment and reduction of life-threatening conditions. Khoza-Shangase and Michal (2014) argue that cost-effectiveness of intervention programs and rehabilitation for diseases may be well established in developing countries, but unavoidably receive lesser financial attention because of higher profile issues.

Inaccessible healthcare is a common yet tragic burden for individuals living in both developed and developing countries. Article 25 of the 1948 United Nation's (UN) Universal Declaration of Human Rights (UDHR) states, "Everyone has the *right* to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing, and *medical care* …" (2015). This and other UN declarations, such as 'The Millennium Development Goals (MDGs)' (2000), and 'The Convention on the Rights of Persons with Disabilities' (2006), should have aided in the establishment of unprejudiced and adequate healthcare systems worldwide (UN, 2000; UN, 2006). Instead, these declarations and statements can be interpreted as rhetoric as there are no mandated laws to enforce action of their member states. The failure to establish an enforceable universal standard of 'fundamental human healthcare' contributes to inaccessible and fragmented medical services worldwide.

To guarantee protection of human health, four elements have been proposed as integral components of a well-functioning healthcare system (Wolff, 2012, p. 14, 26-27). In *The Human Right to Health*, philosopher Jonathon Wolff discusses his opinion toward 'the right to healthcare' as an idea falling somewhere between "the right to medical care versus the right to [being] healthy" (p. 26). These duties of government ensure the achievement of health as a

human right and set the groundwork for any type of humanitarian healthcare, including audiological services. The obligatory elements of healthcare include 1) *availability* (i.e. services sufficient in number to meet population needs), 2) *accessibility* (i.e. services that are non-discriminatory, in safe commuting distance, affordable even for the most economically disadvantaged, and informational based for public education), 3) *acceptability* (i.e. services whose facilities and practices meet standards of medical ethics), and 4) *quality* (i.e. services provided by competent certified professionals) (p. 28). When each element is present and fulfilled in its entirety, the principles act as "protections against standard threats to health", especially in developing countries whose medical care is below these standards (p. 28-29).

WHO (1995) recognizes an increase in the commitment and resources of non-governmental organizations (NGO) in the prevention of hearing loss, but a "persistent inadequacy" of hearing healthcare education and services keeps the 'rhetoric of the law' from becoming reality. Affected individuals and their families or heads of government are forced to advocate for basic hearing healthcare rights, but either lack the communication or capacity to implement comprehensive hearing healthcare outlines (Olusanya et al., 2014). As a result, WHO has devised recommended guidelines for establishing hearing healthcare and patient advocacy, as well as support a 'disability-inclusive Post-2015 Development Agenda' and reciprocal altruistic partnerships between volunteers and host community leaders (WHO, 2012a). Humans of every socioeconomic class and nationality are in need of audiological services, and the humble collaboration of visionary and self-motivated parties can serve to create sustainable audiology programs in developing nations.

The specialized knowledge and training of U.S. audiologists grants them autonomy over the identification, assessment, diagnosis, and treatment of hearing and balance disorders along

with the *ethical duty* to reduce hearing loss through prevention and treatment in patients *around the world* (American Academy of Audiology [AAA], 2004). If an audiologist volunteers audiological services to individuals "experiencing ear or hearing difficulties due to the unavailability of services or diminished financial means, [or establishes and/or mentors] hearing healthcare practitioners in remote regions," they are considered a 'humanitarian audiologist' (Ballachanda et al., 2011). By definition, a humanitarian is a person who is actively engaged in promoting human welfare and social reform, and is motivated by concern with the alleviation of human suffering (Dictionary.com, 2015; Ballachanda et al., 2011). The ethical duty of humanitarian work may seem like a cumbersome job requirement for audiologists with demanding patient caseloads. Nevertheless, humanitarian audiology may be provided *in any part of the world*, whether in remote regions of the U.S. that are isolated from professional hearing services (termed 'Audiology Domestic'), or internationally within the confines of developing countries (termed 'Humanitarian Audiology International') (Ballachanda et al., 2011). If audiologists take the opportunity to volunteer their professional services, it is crucial that they approach their outreach with non-colonialist attitudes that keep cultural safety and sustainable results as their primary program motivators. Hickey, McKenna, Woods, and Archibald (2014) suggest "increased cross-cultural understanding, social consciousness, and propensity toward social action" to prevent egotistical or naïve volunteers from doing more harm than good and instead provide maximal benefit of services to local populations (p. 46).

A diverse group of professionals provides hearing healthcare around the world, but a severe global shortage of specialized hearing healthcare practitioners (i.e. audiologists) continues to exist. An international survey by Goulios and Patuzzi (2008) revealed numerous professionals who assume the job responsibilities of traditional U.S. audiologists, such as otolaryngologists,

general practitioners, nurses, audiology technicians, hearing aid dispensers, speech-language pathologists, and deaf-educators. However, nearly 87% of respondent countries representing both low- and middle-income economies indicated a need for more audiologists (p. 61). In order of significance, the main reasons identified for the professional shortage were a lack of government funding, professional and public awareness, audiology education programs, and relocation of audiologists to developed countries for better employment opportunities (p. 53, 61). The migration of skilled professionals from poor to rich countries is referred to as 'brain drain' and is largely responsible for impeding economic growth and security in developing countries (UN Educational, Scientific and Cultural Organization [UNESCO], 2014). Lastly, a discrepancy in the academic requirements and available clinical training opportunities for audiology students was found, causing a variance in acquired knowledge and skillsets of licensed audiologists (Ballachanda et al., 2011; Goulios & Patuzzi, 2008).

The lack of audiologists in developed versus developing countries further emphasizes the inadequacy of global hearing healthcare services. In 1998, WHO reported that there was one audiologist per 20,000 people in developed countries (Goulios & Patuzzi, 2008). In contrast, there is one audiologist per 500,000 to 6,250,000 in developing countries (Swanepoel et al., 2010). This discrepancy stresses the need for prosperous audiology training programs in regions lacking services. In order to level the heavy imbalance of qualified professionals, an affordable cost-effective hearing healthcare education system must be initiated within existing public and/or private health infrastructures (Goulios & Patuzzi, 2008). An audiology degree is comprehensive, requires expensive tuition, evolving coursework, intensive clinical training, and the use of complex equipment. In addition, every country consists of multiple communities and sub-populations that have unique characteristics and needs. A thorough evaluation regarding the

feasibility and sustainability of hearing programs in each sub-community must be carried out to create relevant and effective training institutions and service delivery models (e.g. basic community-based care or specialized institution-based care).

Although most hearing loss is avoidable through early identification and intervention, the global burden of hearing loss continues to rise. Those in the greatest need of diagnostic services and rehabilitation are unable to access or afford hearing healthcare. Hearing loss is often referred to as a 'silent epidemic' not only because of its invisibility, but also because of the tendency for global healthcare agendas to overlook and underestimate the disability's ramifications on individuals and societies (WHO, 2008). In order to combat the high demand for additional hearing healthcare providers and practices, audiologists in developed countries may be considered the responsible party for professional expansion. Nonetheless, foreign healthcare systems, academic institutions, and government agencies should be fundamental collaborators in the growth of hearing healthcare.

Limited information exists on the current status of humanitarian audiology. There are two professional journals devoted to the humanitarian efforts of audiologists (International Journal of Audiology and The Hearing Journal: Audiology Without Borders). Only one textbook to date, *Audiology in Developing Countries*, dedicated to global hearing healthcare needs and issues surrounding audiology in developing countries. Additional literature is needed to provide audiologists and students with evidence-based research that can both inform and empower the present and upcoming generations of humanitarian audiologists.

In order to better understand the issues related to humanitarian audiology, a national survey of U.S. audiologists was created and distributed to examine 1) the level of participation of U.S. audiologists in humanitarian audiology efforts, 2) barriers preventing U.S. audiologists from

volunteering audiologic services, and 3) topics within humanitarian audiology needing further investigation and research. In addition to these goals, the survey sought to find characteristics related to trips in the group of audiologists who had participated in humanitarian audiology efforts and factors associated with an audiologist's increased participation in future humanitarian efforts.

METHODS

Research reported in this publication received Institutional Review Board approval from the Washington University Medical Center Human Research Protection Office, ID # 201411084, approved 11/21/2014.

Participants

U.S audiologists who are members of state speech-language pathology (SLP) and/or audiology associations (AA) were recruited, upon Washington University School of Medicine Institutional Review Board (IRB) approval to participate in this study. The following state organizations gave permission through e-mail correspondence to recruit their members (CA-AA, CT-AA, GA-AA, KS-Speech Language-Hearing Association, KY-AA, MI-AA, MN-AA, MO-AA, NJ-AA, NY-SLP/AA, OH-AA and SLP, PA-AA, TN-SLP/AA, and VA-AA). In addition, city audiologist rosters (Austin, Houston, and San Antonio, TX) were used for recruitment. The Capstone Research Committee also contacted colleagues in the field for participation in the study through e-mail and social media. Regardless of participant relationship to the Capstone Research Committee, each respondent questionnaire remained anonymous. Personal identifiers were not inquired of participants and all respondent data correlated with a subject identification number.

Materials

A voluntary survey was conducted through the Washington University in St. Louis School of Medicine REDCap website http://redcap.wustl.edu. The survey can be viewed in its entirety in **Appendix A**. REDCap is a secure web-based application for building and managing online surveys and databases (REDCap, 2015). The survey was titled, "Current Perspectives on Humanitarian Hearing Healthcare: A Survey of U.S. Audiologists". The number of questions answered by each participant was dependent on present level of humanitarian experience. A total of twenty-six questions were possible to answer. Question responses were in yes/no, multiple choice, fill-in-the-blank, or ranking format. Participants were not forced to answer every question and could end participation at any time.

A recruiting email contained a description of the survey, participant rights, project investigator contact information, and survey link. **Appendix B** shows a sample of the recruiting email. The recruiting email was forwarded by either 1) the state speech-language pathology and/or audiology associations through their member listserv or a posting on their organization's website and/or social media pages (Facebook, Twitter, LinkedIn), 2) the project investigator through the publically accessible email lists provided on state academy websites and city audiologist roster spreadsheets, or 3) Capstone Research Committee members through email addresses of audiologists they knew personally who may not be members of state audiology academies or city rosters. Participant consent was obtained by clicking on the survey link.

Procedure

The participants were asked, via the recruitment sources above, to complete the online survey. The first recruiting email was sent to the three distributors on January 19, 2015. Participants had three weeks to complete the survey, which took approximately ten minutes. A

reminder email was sent to the same groups of participants via the respective distributors a week and a half after their original distribution date. The exact start and end dates of the survey were determined by the distributors' availability and correspondence with the project investigator. The survey was closed from all participants on March 6, 2015. There was no follow-up with any of the participants, except with those who directly emailed the project investigator with questions or comments regarding the survey.

A total of 360 participants completed the survey; the results were then statistically analyzed and interpreted. The amount of information analyzed from each survey was dependent on the completion of each respondent's survey. Forty-four surveys (12.2%) contained missing data due to participants not answering every question. All questions were statistically analyzed, but missing data were excluded from the analysis. Several questions (11, 13-16, 18, 21-25, 26) had a small amount of missing data (>25%), while a subset of questions had missing data of over 40%. Question 17 ('Select all events and resources used to learn about humanitarian audiology.') had 41% missing data, question 19 ('Who is the most effective partner of collaboration?') had 46% missing data, and question 20 ('Who should be the primary facilitator?') had 77% missing data. There are many reasons participants might have chosen to skip questions. Possible explanations for the largest missing responses have been surmised. Question 17 may have been skipped because respondents had never researched humanitarian audiology before. Questions 19 and 20 were questions of opinion regarding the primary and secondary facilitators of global audiology. Respondents who were indifferent about the issue or who lacked a strong opinion about facilitators may have elected not to answer.

This survey used descriptive statistics to analyze responses of study participants as well as the distribution of responses to survey questions. Number of responses for each category and

corresponding relative frequency were used to describe distribution of responses to each of the questions. In addition to examining the distribution of results amongst all study participants, results were compared between subject groups. Participants who had participated in humanitarian trips and were willing to participate in future trips were compared (using Chi-Square Test and Fischer's Exact Test) to those who had participated, but were unwilling to participate in future trips.

RESULTS

Question one asked respondents to report their level of humanitarian experience and the response determined the total number of survey questions asked. If the respondent answered 'yes' to participating in international humanitarian audiology efforts, nine questions followed to obtain information about their trip(s) (questions 2-10). If the respondent answered 'no' to participating, they were directed to question eleven, which asked of their *willingness* to travel and volunteer their time and services. Of the 360 study participants, sixty-three respondents (17.9%) had participated in international humanitarian audiology efforts while 289 (82.1%) had never volunteered internationally. **Figure 1** displays the level of participation of U.S. audiologists in humanitarian efforts. Of those who had not volunteered (289 participants), 229 (63.3%) were willing to volunteer in future international humanitarian efforts regardless of the type of funding (private, public, and/or personal funding).

There was a wide distribution of international humanitarian efforts. Thirty-three humanitarian audiologists (51.6%) had participated in one trip, while the rest had participated in two or more trips (48.4%) and nearly half of those participants (29.1%) completed four or more trips. Other questions regarding humanitarian trips and resources (3, 4, 6, 8, and 17) allowed respondents to select more than one answer, or from an 'unlimited choice' answer set. This type

of question format explains response data exceeding 100%. Most humanitarian audiologists (n=50, 82%) participated in international audiology efforts following completion of the audiology degree and only one audiologist (1.6%) participated during undergraduate school. Almost all audiologists (n=62, 98.4%) volunteered in trips lasting one to two weeks while one audiologist (1.6%) participated in a trip lasting three to four weeks, and no respondents participated in a trip lasting two months or longer (0%). NGOs organized the majority of humanitarian audiology trips (n=41, 65.1%), while local teams of professionals (n=18, 28.6%) and individual pursuits (n=10, 15.9%) organized trips less often. Private organizations and hearing aid manufacturers directed trips for seven respondents each (11.1%). A major source of trip funding came from personal earnings of volunteers (n=38, 60.3%) while the remainder was a mixture of private, public, and/or personal funding (i.e. 'group funding').

The majority of international humanitarian trips include the following services: hearing aid fittings (n= 52, 82.5%), hearing screenings (n=45, 71.4%), diagnostic evaluations (n=42, 66.7%), hearing healthcare education (n=41, 65.1%), and training of local individuals (n=34, 54%). The distribution of humanitarian audiology services can be viewed in **Figure 2**. In addition, aural (re)habilitation (n=14, 22.2%) and deaf education services (n=6, 9.5%) are occasionally provided. Cochlear implant surgery and device programming are the least common services (n=3, 4.8%). The countries in which audiologists volunteered their services, and the frequency of trips to those countries are displayed in **Table 1**. A world map of humanitarian audiology efforts is shown in **Figure 3**. The leading country for U.S. audiologist humanitarian work is Mexico (n=22), followed by Honduras and Peru (n=7), then Dominican Republic and Guatemala (n=3). In total, thirty-two countries are represented by humanitarian audiologists from the U.S. One respondent listed West Africa as a region of visit, but a country was not specified.

Over half of humanitarian audiologists (n=37, 58.7%) have not revisited their host community or used telecommunication technology (i.e. two-way voice and visual communication) with local service providers for trip follow-up. One-third of the audiologists (n=21, 33%) returned to their host community but did not provide ongoing communication via telecommunication. Telecommunication technology was only used by five audiologists (7.9%) as a method of follow-up, while two of those audiologists (3.2%) reported using telecommunication technology in addition to their follow-up visit. Although a large portion of audiologists (n= 40, 60%) did not revisit their host community, most humanitarian audiologists would like to continue their international efforts. Sixty of sixty-three humanitarian audiologists (95.2%) agreed to volunteer in future international audiology efforts. Three audiologists (4.8%) declined further participation in future international efforts. However, these participants believe audiologists in developed countries should be the primary facilitators of global audiology. Two of the three participants also agreed that the top two barriers to international humanitarian audiology are 1) financial constraints, and 2) cultural/linguistic differences.

Nine barriers were proposed as obstacles to audiologist participation in humanitarian efforts. Respondents were asked to rank the top five barriers (with one being the greatest barrier) preventing their participation. All barriers were ranked within the 'top five barriers', but barriers ranked 'number 1' (i.e. 'top barrier') most frequently were considered the greatest obstacles. The greatest barriers to participation were financial constraints, family obligations, vacation time, long-distance follow-up care, and knowledge regarding trip organization. **Figure 4** reveals the ranking of barriers according to greatest frequency of response. An order effect may explain the responses, as the most frequently cited barriers were also listed as the first five answer choices.

Humanitarian audiologists did not have a greater inclination to speak more foreign languages, nor did they have a stronger background in humanitarian audiology as a graduate student. There were 260 respondents (83.3%) who spoke only English, 39 respondents (12%) who were bilingual, 11 respondents (3.5%) who were trilingual and 2 respondents (0.6%) who spoke four or more languages. The level of humanitarian experience offered by the respondents' graduate schools varied. Nearly half of the respondents (n=154, 49%) attended graduate schools that did not offer any humanitarian service, while the majority of the remaining respondents (n=141, 44.9%) attended graduate schools that provided free or discounted audiology services in the local community. Six audiologists (1.9%) reported their graduate schools offered international humanitarian trips, and thirteen audiologists (4.1%) reported that their graduate schools offered both domestic and international humanitarian audiology.

Questions 15 and 24 ('Does your current place of employment provide free, discounted, or Medicaid services?' and 'Do you contribute to a Political Action Committee?') revealed significant differences between humanitarian audiologists, and questions 22 and 23 ('Would you be willing to lead a humanitarian trip?' and 'Would you be willing to volunteer audiology via telecommunication services?') revealed significant differences between non-humanitarian audiologists who are *willing* to volunteer. Compared to those without humanitarian audiology experience, audiologists with humanitarian experience were more likely to have a current place of employment that offered either free or discounted audiology services to the surrounding community, or supplied healthcare to Medicaid beneficiaries (*P=0.045*). In addition, humanitarian audiologists were more likely to contribute to one or more Political Action Committees (PAC) *(P=0.045).* In respondents without humanitarian experience but who are willing to participate, 147 respondents (70%) declined a humanitarian audiologist leadership

position (*P=0.001*) but were willing to provide audiology support via telecommunication technology (*P <0.001*).

Questions 12-26 were independent of humanitarian experience and could be answered by all participants. When asked if audiologists in developed countries should be the primary facilitators of global audiology, 207 respondents (70%) agreed. However, this group was split equally when asked who the most effective partner of collaboration should be. Eighty-two respondents (34.7%) chose academic institutions, 81 (34.3%) chose government agencies, and 73 (30.9%) chose existing healthcare systems. The remaining 94 respondents (31.2%) who did not believe audiologists should be the primary facilitators held more similar views toward partners of collaboration. Fifty-one respondents (43.2%) chose existing healthcare systems as the primary facilitator, 45 respondents (38.1%) chose government agencies, and 22 respondents (18.6%) chose academic institutions. A total of 273 respondents (88.1%) believe quality 'best-practice' hearing healthcare should be available to all individuals regardless of ability to pay, while 37 respondents (11.9%) do not. **Figure 5** shows the audiologists' beliefs in provision of quality hearing healthcare.

To cultivate future generations of U.S. humanitarian audiologists, audiology programs should offer increased humanitarian audiology education that can be delivered through workshops or courses to students. Most respondents did not feel it is necessary to offer a mandatory humanitarian audiology course, but feel that workshops (n=150, 48.2%) and elected courses (n=118, 37.9%) are appropriate alternatives. Forty-five respondents (14.5%) do not think supplemental humanitarian audiology education was necessary.

Professional events, articles, and websites are additional resources for humanitarian education. The most common events and resources respondents reported using were 'unspecified

journals or websites' (n= 110, 51.4%), The Hearing Journal: Audiology Without Borders (n=98, 45.8%) and the annual AudiologyNOW! Humanitarian Meeting (n=79, 36.9%). Less than 25% of respondents gathered information from eAudiology web seminars (n=42, 19.6%), the International Journal of Audiology (n=34, 15.9%), AAA Taskforce on Global and Humanitarian Efforts (n=34, 15.9%), and the Coalition for Global Hearing Health (n=20, 9.3%). It is possible that audiologists use other print and online materials to learn about humanitarian audiology. A 'free response' choice option that allowed participants to provide 'other' events and resources may have given additional insight into this question.

The last two survey questions focused on valued humanitarian audiology services and the appropriateness of amplification in developing countries. The most valued humanitarian audiology service is training of local service providers (n=172, 55.7%) followed by distribution of amplification (n=103, 33.3%). Referral to physician (n=15, 4.9%), infant hearing screening (n=11, 3.6%), and diagnostic testing (n=8, 2.6%) are valued by less than 5% of respondents each. **Figure 6** displays the differences of opinion toward valued audiological services. When asked if provision of amplification without follow-up services or accessible supplies was appropriate, 218 respondents (69.9%) answered 'no'. Ninety-four respondents (30.1%) feel it is appropriate to provide amplification without follow-up. The respondents' opinions toward appropriate distribution of amplification can be observed in **Figure 7**.

DISCUSSION

This Capstone Project is the first national survey of U.S. audiologists to investigate the present level of humanitarian audiology efforts and the barriers to humanitarian participation, which if lifted, would reduce the global burden of hearing loss. The results show a high interest among U.S. audiologists to participate in humanitarian audiology. A large percentage of

audiologists would like to continue (95.2%) or start (63.3%) volunteering their services in developing countries. This strong willingness to participate in international humanitarian efforts is encouraging for the development of global hearing healthcare and emphasizes an increase in humanitarian education among U.S. audiologists and audiology students.

A gap exists between an audiologist's willingness to participate and their actual participation in international humanitarian efforts. Although 70% of respondents believed audiologists from developed countries should be the primary facilitators of international audiology, only 17.9% are actively involved in humanitarian efforts. NGOs facilitated a majority of the humanitarian audiologist trips (65.1%), but more humanitarian audiologists are needed to help conquer the global burden of hearing loss. As WHO stated in the 48th World Health Assembly (1995), NGOs are not enough to address the serious shortage of hearing healthcare providers. The provision of hearing healthcare to low- and middle-income economies relies on the collaboration of volunteers and host communities. Sustainable hearing healthcare programs will not occur without the unified efforts of multiple parties (NGOs, hearing healthcare professionals, and host community leaders).

This survey contains insightful information about past humanitarian audiology efforts and gives possible predictors of future humanitarian audiologists. Most of the humanitarian audiologists volunteered in only one trip, but would like to continue volunteering their services internationally. The map of countries visited by audiologists (**Figure 3**) shows the development of global hearing healthcare. NGOs and local teams of hearing healthcare professionals organized most humanitarian trips. The average duration of trips was one to two weeks and did not typically involve follow-up. However, humanitarian audiologists were found to deliver more free or discounted hearing healthcare services through their regular work setting and were also

found to contribute more often to PACs. These findings may reflect a generous spirit among humanitarian audiologists that seeks to serve underresourced individuals with hearing loss in and beyond the U.S. Donating both time and money shows a humanitarian's dedication to not only the patient population he or she serves, but also their profession's political progression.

Hearing aid fittings were the most popular type of humanitarian service, followed by hearing screenings, preventative hearing healthcare education, diagnostic evaluations, and training of local service providers. WHO estimates that "the current production of hearing aids meets less than 10% of the global need" and less than 3% of hearing aid candidates in developing countries actually receive devices (WHO, 2014). Per this survey, current humanitarian audiology efforts are not significant enough to alleviate this need. Most respondents acknowledge the distribution of hearing aids should only occur in the presence of local follow-up and device supplies. Aural (re)habilitation, deaf education, and cochlear implantation and programming were the least common volunteer services. This might be explained by a recent survey of surgeons regarding best-practice humanitarian cochlear implantations. Surgeons indicated minimal requirements for operation, including local audiologist support, otologists with mastoid training, and speech-language pathologists (Saunders and Barrs, 2010). Cochlear implants are more involved than most audiological services, but follow-up is essential to ensuring the highest level of patient benefit. 'Best-practice' hearing healthcare in developing countries upholds the same high standards and ethical practices that are expected in the U.S. (Clark, 2013a). Best-practice care involves conversations with host community leaders to ensure understanding of local healthcare needs and resources and facilitation of sustainable audiology program goals that place patient wellbeing as top priority (Clark, 2013b; Clark, 2013c).

Although each barrier to international humanitarian participation was ranked a 'top barrier', five barriers were considered the greatest obstacles: limited financial resources, family obligations, vacation time, long-distance follow-up opportunities, and knowledge regarding trip organization. Although international audiology is a serious need, it is important to note that domestic audiology in the U.S. is plentiful and should be considered by audiologists who are unable to collect sufficient trip funds or devote long stretches of time away from home and work (Clark, 2013). Participation in international audiology presents unique challenges for audiologists and realistic solutions are necessary for increased participation. The largest barriers to humanitarian participation listed by respondents have the ability to be eliminated or reduced, which would have a positive impact on an audiologist's ability to volunteer. Specifically, the audiology community should focus on the following goals for increased humanitarian participation: 1) gaining interest and support from private and public organizations for international trip planning and funding, 2) arranging specific leave time or increased work flexibility with employers for humanitarian efforts, 3) teaching audiologists about the use and potential of telecommunication technology in long-distance healthcare, and 4) creating useful informational resources for interested humanitarian audiologists and audiology students. The second greatest barrier of family obligations will be difficult to resolve through a public approach, as family demands are private and unique to each parent.

It will be a challenge to achieve the previously listed goals and a comprehensive approach will be needed. First, partnering with philanthropic organizations that organize and fund international healthcare can provide both trip organization and financial relief for humanitarian audiologists. This partnership with a well-established organization, especially during an audiologist's first international humanitarian trip, can reduce uncertainty and provide

structured outreach plans. Another benefit of working with an organization is the networking of professionals and sharing of resources. Similar groups of healthcare professionals may be invited to participate, such as speech-language pathologists, audiologists, deaf educators, and otolaryngologists, to enhance the overall service delivery of humanitarian projects. If there is no partnership with an organization, separate fundraisers and donated supplies and equipment will be of great importance in the feasibility and success of their trip. Second, employers' willingness to grant additional leave time or set aside separate work allocations for humanitarian outreach is needed. Audiologists are time-constrained with high patient caseloads and demanding job responsibilities. If they are forced to use vacation time for international audiology efforts, the number of audiologists who are able to participate will be less, especially those with familial obligations. Third, telecommunication technology can 'eliminate' the distance between audiologists in developed countries and hearing healthcare providers in isolated regions (Swanepoel et al., 2010). Real-time and/or 'stored and forwarded' Internet healthcare instruction (i.e. telehealth) offers a simplistic and cost-effective medium for educating and training hearing healthcare professionals, counseling patients and families managing hearing loss, and assisting in the proper screening, diagnosis, and intervention of hearing loss (Swanepoel et al., 2010). In particular, telecommunication technology may be invaluable in the distribution of hearing aids. The successful dispensing of a hearing aid requires multiple audiology appointments, which are not realistic in a short-term humanitarian trip and seventy percent of respondents do not think it reasonable to distribute amplification in the absence of follow-up (i.e. trained local service providers and feasible device maintenance options). Therefore, it stands to reason the magnitude of patients who can receive hearing aid care will be enhanced through the use of telecommunication services in developing countries. Live workshops and interactive online

training can teach audiologists how to use telecommunication technology. Nearly 80% of respondents indicated a willingness to learn to use telehealth for long-distance care. Lastly, useful online resources should be created to provide an aggregated compilation of humanitarian audiology information, including trip recruitment. Online lists of journal readings and other helpful websites may give audiologists and audiology students the 'jump start' they need to become active humanitarians. Although popular resources within the humanitarian audiology community were listed in this survey (e.g., The Coalition for Global Hearing Health and AAA TaskForce on Global and Humanitarian Efforts), the largest percentage of respondents reported using 'other journals and websites' as their main resources for information. To bring attention to both well- and lesser-known resources, professional or student-led humanitarian audiology committees may be possible parties for this undertaking. Both committees could reach large groups of members with interactive webpages that promote ongoing humanitarian audiology discussions and updated trip opportunities. Humanitarian education is also a key source in the empowerment of future humanitarian leaders. Sixty-eight percent of respondents were not willing to lead a humanitarian trip at the time of the survey. Their hesitancy is natural, as it demonstrates the need for humanitarian experience before accepting a leadership responsibility. Positions of leadership hold great influence, and unintentional consequences to patients and community can be prevented through the wise guidance and counsel of experienced volunteers. Volunteers must learn to respect their host community's customs and traditions and provide "culturally sensitive and safe services that are engaging, genuine, creative and mutually beneficial" (Guttentag, 2009).

Limitations

An accurate estimation of licensed audiologists reached by this survey was difficult to obtain. Recruiting lists contained unknown numbers of speech-language pathologists, non-active audiologists members, retired audiologists, and outdated audiologist email listings. Some state audiology and speech-language pathology associations only posted the survey link on their social media pages. It is not known how often audiologists check their state academy social media pages, or how helpful social media recruitment is compared to direct email invitations.

Since survey participants were not required to answer every question, missing data may interfere with the ability to generalize results. An order effect may have been observed on question eight ('What services were provided during humanitarian audiology efforts?') as well, though answers are thought to be representative of majority opinion. Lastly, one respondent emailed the project investigator with a request of more 'free response' answers. This type of answer format could have provided additional information, but would have reduced the impact of statistical analysis.

Future Research

This Capstone Project provided characteristics of past humanitarian audiology efforts but did not investigate traits of humanitarian audiologists or explore reasons for volunteering. The age of an audiologist, number of years working as a licensed professional, and decision factors to becoming a humanitarian audiologist may identify the average type of humanitarian audiologist. In addition, discovering the effect mentorship has on participation in humanitarian audiology could further promote increased participation.

The current study examined barriers to international audiology but did not evaluate resolutions of those barriers. Future research could assess the effectiveness of 'barrier removal'

on increased humanitarian participation. For example, strategic solutions for each barrier could be implemented to evaluate its effect on audiologist efforts. Future research could also be integrated at the graduate school level to examine the effects of humanitarian outreach, locally and internationally, and broadened curricula, such as humanitarian workshops and courses, on future humanitarian audiologist participation.

CONCLUSION

The first national survey of U.S. audiologist participation in humanitarian audiology reveals a willingness among audiologists to reduce the global burden of hearing loss. A small group of humanitarian audiologists have volunteered their services across thirty-two countries. However, numerous barriers to international audiology must be removed before more audiologists can help resolve this largely preventable disorder. Hearing loss is the most prevalent disabling condition and an unequal distribution of hearing healthcare providers and practices exists in the developing world. The training of local service providers by audiologists from developed countries is invaluable in the development of sustainable hearing healthcare. The potential to decrease the individual and societal costs of hearing loss and increase the resilience among affected individuals is significant. The primary initiators of change are the visionary and self-motivated partnerships of volunteers and host communities. Heightened humanitarian education and empowerment within U.S. audiologists and audiology students is essential to altering the disparity of quality hearing healthcare around the globe.

REFERENCES

American Academy of Audiology. (2004, January). *Scope of Practice.* Retrieved from http://www.audiology.org/publications-resources/document-library/scope-practice

Allen, T. (1986). Patterns of academic achievement among hearing impaired students: 1974 and 1983. In S. Karchmer (Ed.), *Deaf children in America*. Boston, MA: Little, Brown.

Amnesty International. (2015). *Universal Declaration of Human Rights.* Retrieved from http://www.amnestyusa.org/research/human-rights-basics/universal-declaration-of-human-rights

Ballachanda, B., Banerjee, S., Clark, J., Coverstone, J., Cunningham, R., Prieve, B., & Ryals, B. (2011). Report of the global and humanitarian efforts: Presidential task force. In *American Academy of Audiology*. Retrieved January 18, 2015, from http://audiology-web.s3.amazonaws.com/migrated/20130122_ReportTaskforceHumanitarianAndGlobal.pdf_539970fb37e224.16981729.pdf

Centers for Disease Control and Prevention. (2014, November 17). *Hearing loss in children.* Retrieved from http://www.cdc.gov/ncbddd/hearingloss/genetics.html

Clark, J. L. (2013a). Listening to the world's call for humanitarian hearing healthcare services. *The Hearing Journal*, *66*(12), 10-14.

Clark, J. L. (2013b). Should humanitarian hearing healthcare providers be concerned about ethical practices? Part one: Need for continued engagement. *The Hearing Journal*.

Clark, J. L. (2013c). Should humanitarian hearing healthcare providers be concerned about ethical practices? Part two: Doing what's best. *The Hearing Journal*.

Dictionary.com. (2014). *Humanitarian.* Retrieved from http://dictionary.reference.com/browse/humanitarian?s=t

Geographic Map Displaying Countries Represented by Visits from U.S. Audiologists
Map created by Amy M. Suiter using *Tableau*

Gosselin, P., & Gagné, J. (2010). Use of a dual-task paradigm to measure listening effort. *Canadian Journal of Speech-Language Pathology and Audiology*, *34*(1), 43-51.

Goulios, H., & Patuzzi, R. (2008). Education and practice of audiology internationally: affordable and sustainable education models for developing countries. In *Audiology in Developing Countries* (pp. 51-73). New York, NY: Nova Science Publishers, Inc.

Guttentag, D. A. (2009, March 26). The possible negative impacts of volunteer tourism. *International Journal of Tourism Research*, *11*, 537-551.

Harris, J., Anderson, J., & Novak, R. (1995). An outcome study of cochlear implants in deaf patients: Audiologic, economic and quality of life changes. *Arch Otolaryngology Head Neck Surg*, *121*, 398-404.

Helvik, A., Jacobson, G., & Hallberg, L. (2006, May). Psychological well-being of adults with acquired hearing impairment. *Disability and Rehabilitation*, *28*(9), 535-545.

Hickey, E. M., McKenna, M., Woods, C., & Archibald, C. (2012). Ethical concerns in voluntourism in speech-language pathology and audiology. *Perspectives on global issues in communication sciences and related disorders*, *2*, 40-48.

Jones, L., Bellis, M. A., Wood, S., Hughes, K., McCoy, E., Eckley, L., & Bates, G. (2012, July). Prevalence and risk of violence against children with disabilities: A systematic review and meta-analysis of observational studies. *Lancet*. doi:http://dx.doi.org/10.1016/S0140-6736(12)60692-8

Khoza-Shangase, K., & Michal, G. (2014, January 27). Early intervention in audiology: exploring the current status from a developing country context. *British Journal of Medicine & Medical Research*, *4*(11), 2238-2249.

McPherson, B. (2008). Audiology: A developing country context. In *Audiology in Developing Countries* (pp. 5-20). New York, NY: Nova Science Publishers, Inc.

Mohr, P. E., Feldman, J. J., Dunbar, J. L., McConkey-Robbins, A., Niparko, J. K., Rittenhouse, R. K., & Skinner, M. W. (2000). International Journal of Technology Assessment in Health Care. *The societal costs of severe to profound hearing loss the United States*, *16*(4), 1120-1135.

Olusanya, B. O., Neumann, K. J., & Saunders, J. E. (2014, February 18). The global burden of disabling hearing impairment: A call to action. *Bulletin of the World Health Organization*, *92*, 367-373. doi:http://dx.doi.org/10.2471/BLT.13.128728

Olusanya, B., Ruben, R., & Parving, A. (2006). Reducing the burden of communication disorders in the developing world. *JAMA*, *296*, 441-444.

REDCap (2015). In *REDCap Washington University in St. Louis School of Medicine*. Retrieved April 21, 2015, from https://redcap.wustl.edu/redcap/srvrs/prod_v3_1_0_001/redcap/

Ruben, R. (2000). Redefining the survival of the fittest: communication disorders in the 21st century. *Laryngoscope*, *110*, 241-245.

Saunders, J., & Barrs, D. (2011, March 11). Cochlear implantation in developing countries as humanitarian service: Physician attitudes and recommendations for best practice. *Otolaryngology – Head and Neck Surgery, 145*(74), 74-79.

Smith, A. W. (2008). Demographics of hearing loss in developing countries. In *Audiology in Developing Countries* (pp. 21-50). New York, NY: Nova Science Publishers, Inc.

Smith, A., & Mathers, C. (2006). Epidemiology of infection as a cause of hearing loss. In *Infection and hearing impairment* (pp. 31-66). Chichester: John Wiley & Sons.

South Africa. (2012, July 2). *Health care in South Africa.* Retrieved from http://www.southafrica.info/about/health/health.htm#.VQjUkIu4mqA

Swanepoel, D., Clark, J. L., Koekemoer, D., Hall III, J. W., Krumm, M., Ferrari, D. V., & McPherson, B. (2010). Telehealth in audiology: The need and potential to reach underserved communities. *International Journal of Audiology*, *49*, 195-202.

Swanepoel, D., & Storbeck, C. (2008). EHDI Africa: Advocating for infants with hearing loss in Africa. *International Journal of Audiology*, 1-5.

Trybus, R. J., & Karchmer, M. A. (1977). School achievement scores of hearing impaired children: National data on achievement status and growth patterns. In *American Annals of the Deaf*, 122, 62-69.

Tucci, D. L., Merson, M. H., Wilson, B. (2010). A summary of the literature on global hearing impairment: Current status and priorities for action. *Otology & Neurotology. 31*(1):31-41.

United Nations Educational, Scientific and Cultural Organization [UNESCO]. (2014). *Skilled migration and brain drain.* Retrieved from http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/projects/skilled-migration-and-brain-drain/

United Nations. (2000). *United Nations Millennium Declaration.* Retrieved from http://www.un.org/millennium/declaration/ares552e.htm

United Nations. (2006). *Convention on the rights of persons with disabilities.* Retrieved from from http://www.un.org/disabilities/convention/conventionfull.shtml

Voss, J. M., & Lenihan, S. T. (2014). Fostering resilience in children living in poverty: Effective practices and resources for EHDI professionals. In *The NCHAM eBook: A Resource Guide for Early Hearing Detection & Intervention (EHDI)* (pp. 13-32).

Wilson, L. (2013, July). Moving toward hearing health for all. *The Hearing Journal: Audiology Without Borders*. Retrieved from http://journals.lww.com/thehearingjournal/Fulltext/2013/07001/Moving_Toward_Hearing_Health_for_All.3.aspx

World Bank Group. (2014, July 3). Updated income classifications. Retrieved from http://data.worldbank.org/news/2015-country-classifications

World Health Organization. (1995, May 12). *WHA48.9 prevention of hearing impairment.* Retrieved from http://www.who.int/pbd/publications/wha_eb/wha48_9/en/

World Health Organization. (2008). *The global burden of disease: 2004 update.* Retrieved from http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf?ua=1

World Health Organization. (2012a). *Health in the post-2015 development agenda.* Retrieved from http://www.who.int/topics/millennium_development_goals/post2015/post2015_thematic_consultation_health_process_20121003.pdf?ua=1

World Health Organization. (2012b). *WHO global estimates on prevalence of hearing loss.* Retrieved from http://www.who.int/pbd/deafness/WHO_GE_HL.pdf?ua=1

World Health Organization. (2013). *Millions of people in the world have hearing loss that can be treated or prevented.* Retrieved from http://www.who.int/pbd/deafness/news/Millionslivewithhearingloss.pdf

World Health Organization. (2014, February). *Deafness and hearing loss.* Retrieved from http://www.who.int/mediacentre/factsheets/fs300/en/

World Health Organization. (2015). *Deafness estimates.* Retrieved from http://www.who.int/pbd/deafness/estimates/en/

Wolff, J. (2012). *The Human Right to Health* (pp. 26-27). New York, NY: W. W. Norton & Company, Inc

Yoshinaga-Itano, C., Sedey, A., Coulter, D., & Mehl, A. (1998, November). Language of early- and later-identified children with hearing loss. *Pediatrics*, *102*(5), 1161-1171.

FIGURES

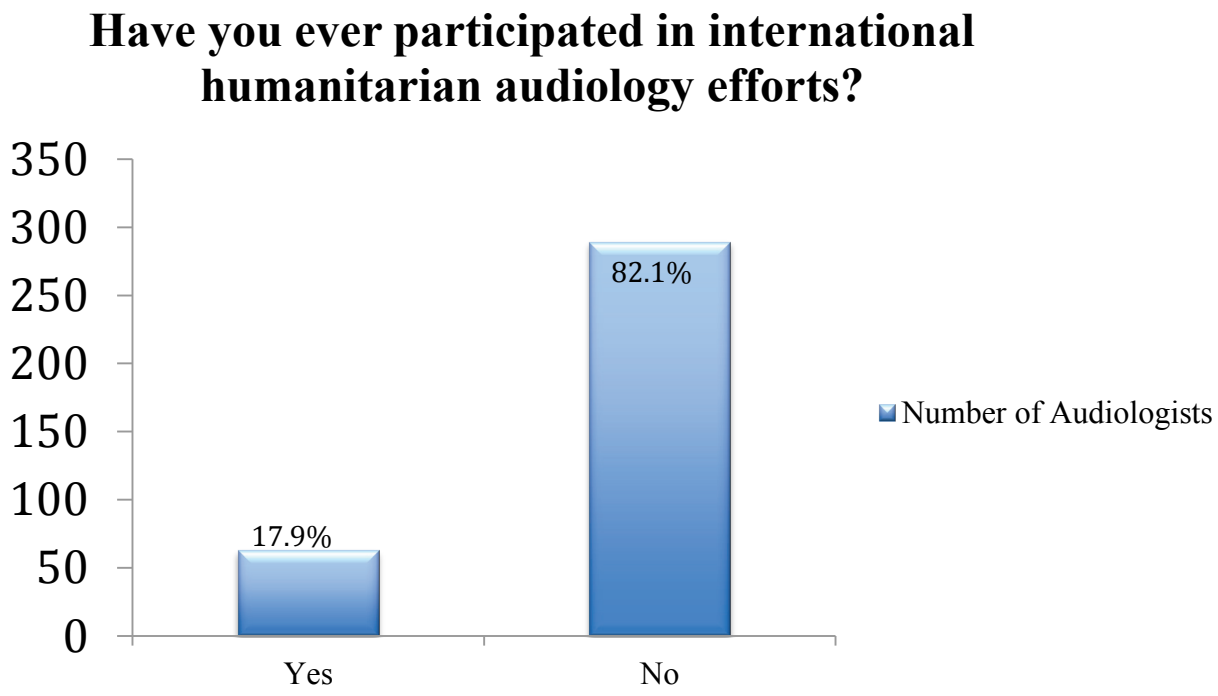

Figure 1. Present level of U.S. audiologist humanitarian experience

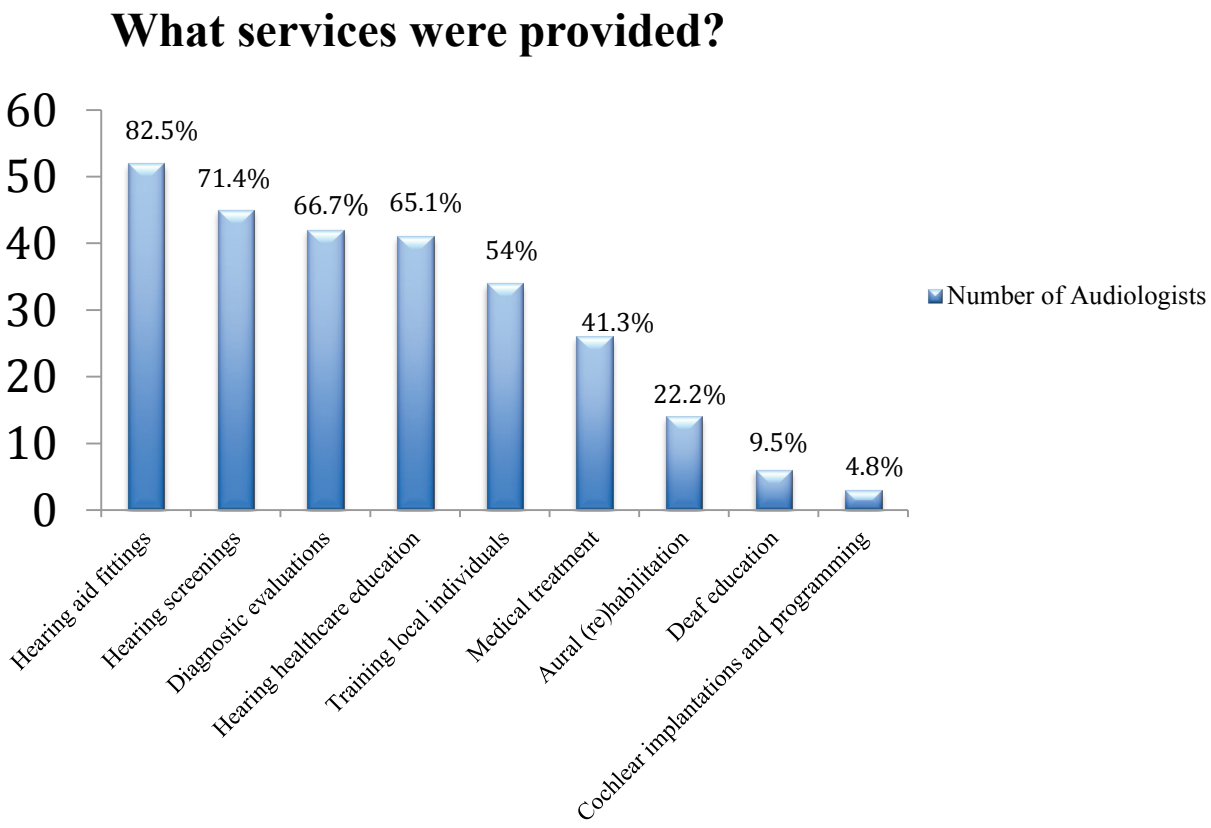

Figure 2. Leading services provided by U.S. humanitarian audiologists

Countries Visited by Audiologists	Frequency
Albania	1
Argentina	1
Belize	3
Burkina Faso	1
Colombia	1
Democratic Republic of the Congo	1
Dominican Republic	5
Ecuador	3
Ethiopia	3
Guatemala	5
Haiti	1
Honduras	7
Ireland	1
Jamaica	1
Jordan	1
Kenya	2
Laos	1
Liberia	1
Malawi	1
Mexico	22
Nicaragua	3
Nigeria	1
Palestinian Territories	1
Paraguay	1
Peru	7
Russia	1
Rwanda	1
Sierra Leone	1
South Africa	3
Taiwan	1
Vietnam	2
Zambia	1
Number of Trips	86
Total Countries Visited	32

Table 1. Countries visited by U.S. humanitarian audiologists and frequency of trips

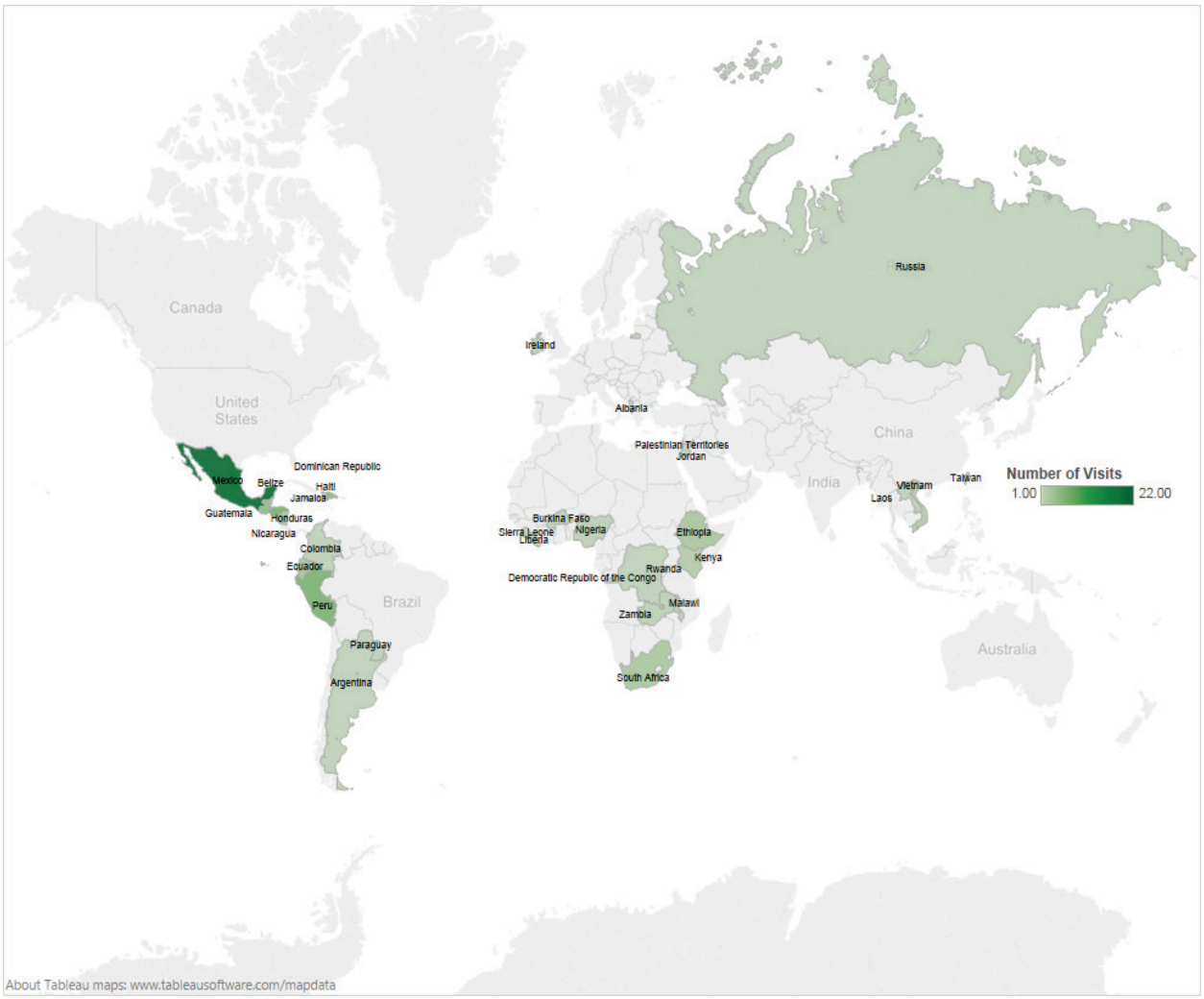

Figure 3. Geographic Map of U.S. Audiologist Humanitarian Efforts

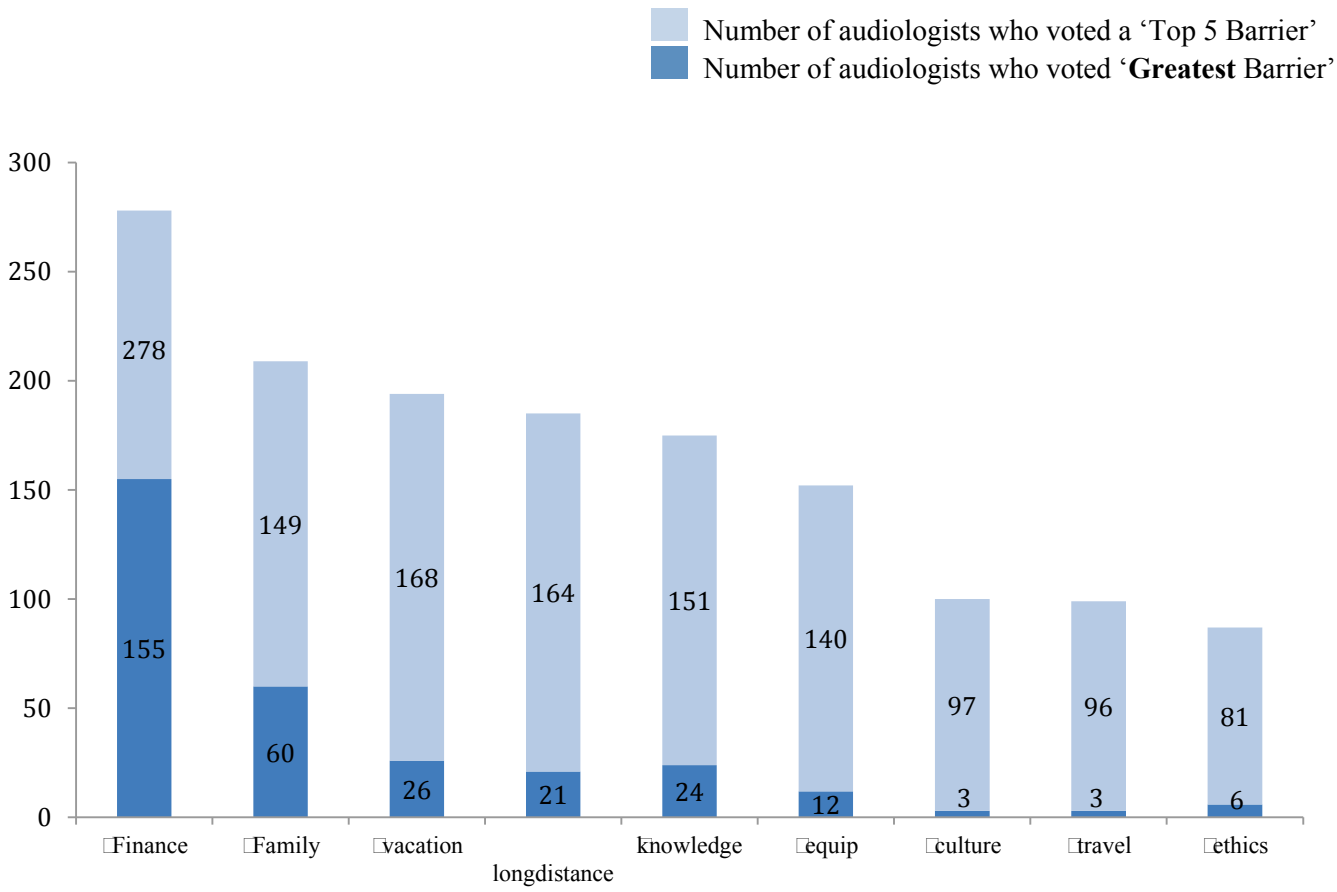

Figure 4. Top 5 barriers to increased humanitarian audiology participation

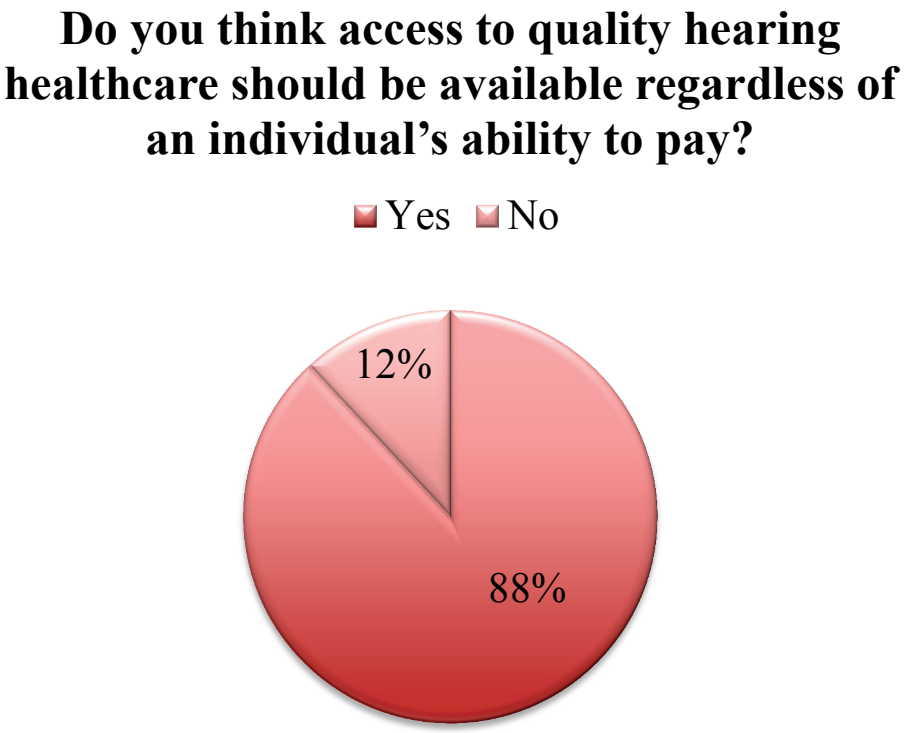

Figure 5. Audiologist belief in provision of quality hearing healthcare

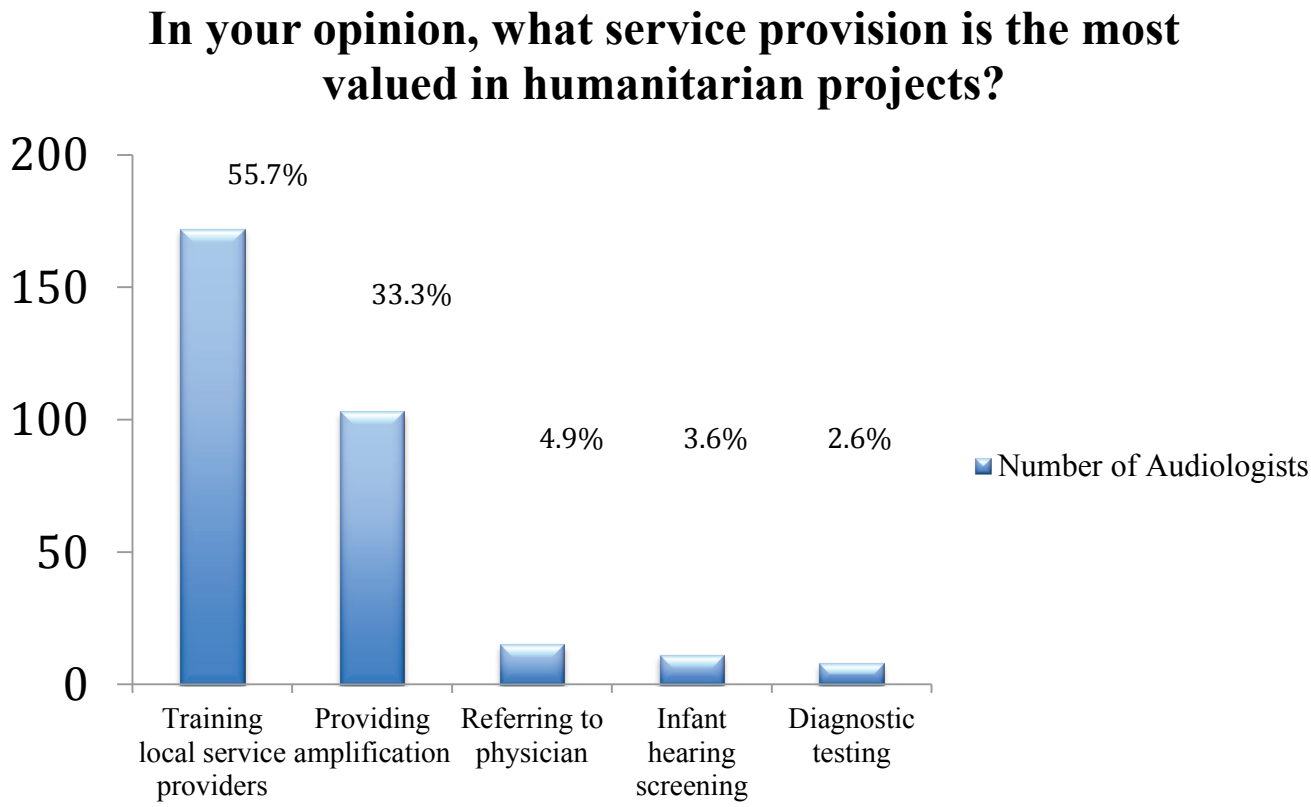

Figure 6. Most valued humanitarian audiology services

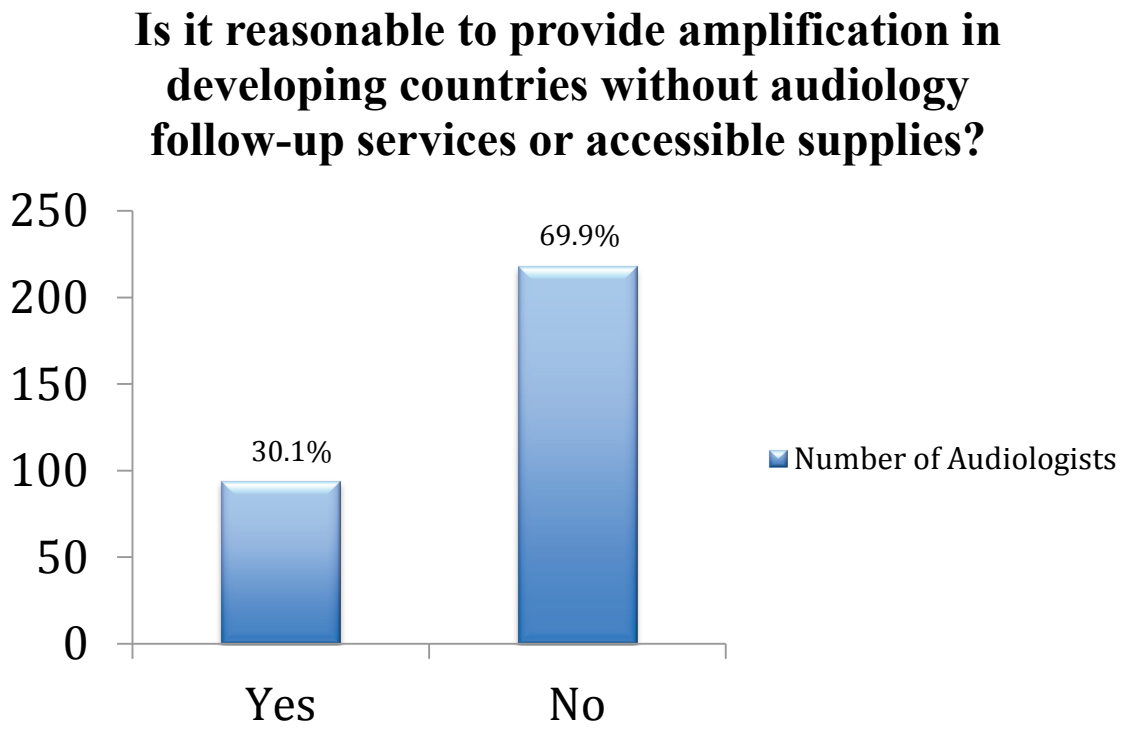

Figure 7. Audiologist opinions toward appropriate distribution of amplification

APPENDIX A

Current Perspectives on Humanitarian Hearing Healthcare:
A Survey of U.S. Audiologists

1. Have you ever participated in international humanitarian audiology efforts?
    - Yes (If Yes, participant directed to questions 2-10)
    - No (If No, participant directed to questions 11+)

---

2. How many international humanitarian audiology trips have you participated in?
    - 1
    - 2
    - 3
    - 4 or more
3. When did you participate? (Please select all that apply.)
    - Undergraduate school
    - Graduate school
    - Post-graduate school
4. What was the duration of your trip(s)? (Please select all that apply.)
    - 1-2 weeks
    - 3-4 weeks
    - 2 months +
5. What countries did you volunteer your services? (Please list countries, separated by spaces.)
6. With whom was the trip organized? (Please select all that apply.)
    - Individual pursuit
    - Local team of professionals
    - Non-profit organization
    - Private organization
    - Hearing aid manufacturer
7. Who provided trip funding?
    - Individual funding
    - Private or public funding
    - Group funding
8. What services were provided? (Please select all that apply.)
    - Hearing healthcare education
    - Training local individuals
    - Hearing screenings
    - Diagnostic evaluations
    - Medical treatment
    - Hearing aid fittings
    - Cochlear implantations and programming
    - Aural (re)habilitation
    - Deaf education

9. Have you revisited the community or used telecommunication technology (i.e. two-way voice and visual communication) to provide follow-up services?
    - Yes: another trip
    - Yes: telecommunication technology
    - Yes: trip and telecommunication
    - No
10. Would you participate in future humanitarian audiology trips?
    - Yes
    - No

---

11. Would you be willing to travel and volunteer your time and services in developing countries?
    - Yes, with my own finances
    - Yes, with private or public funding
    - Yes, with group funding
    - No

---

12. On the next page, please rank the top 5 barriers preventing audiologists from participating in international humanitarian efforts. Some rows will not have a rank. (Rank 1 as the greatest barrier, 5 as the smallest barrier.)
    - Financial constraints
    - Family obligations
    - Vacation time
    - Knowledge re: trip organization
    - Travel contacts
    - Equipment/hearing devices
    - Cultural/linguistic differences
    - Ethical/personal beliefs
    - Long-distance follow-up care
13. How many languages can you speak fluently?
    - 1
    - 2
    - 3
    - 4 or more
14. Did your graduate program offer free or discounted audiology services, locally and/or internationally?
    - Local
    - International
    - Both
    - Neither

15. Does your current place of employment provide free or discounted audiology services to the community, or supply healthcare to Medicaid beneficiaries?
    - Yes: community outreach
    - Yes: Medicaid beneficiaries
    - Yes: both
    - No
16. Do you think access to quality hearing healthcare should be available regardless of an individual's ability to pay?
    - Yes
    - No
17. Select all events and resources you have used to learn more about humanitarian audiology:
    - AudiologyNOW! Humanitarian Meeting
    - eAudiology Web Seminars
    - AAA TaskForce on Global and Humanitarian Efforts
    - Coalition for Global Hearing Health
    - International Journal of Audiology
    - The Hearing Journal – Audiology Without Borders
    - Other journals or websites
18. Should audiologists in developed countries be the primary facilitators of global audiology?
    - Yes (If Yes, participant directed to question 19)
    - No (If No, participant directed to question 20)

---

19. Who is the most effective partner of collaboration?
    - Academic institutions
    - Government agencies, such as the Department of Health and Education
    - Existing healthcare systems

---

20. Who should be the primary facilitator?
    - Academic institutions
    - Government agencies, such as the Department of Health and Education
    - Existing healthcare systems

---

21. Should audiology programs offer a separate course in their curriculum regarding humanitarian audiology?
    - No, not necessary
    - No, but offer workshops
    - Yes, as an elected course
    - Yes, as a mandatory course
22. Would you be willing to lead a humanitarian trip?
    - Yes
    - No

23. Would you be willing to volunteer audiology services via telecommunication technology/two-way voice and visual communication?
    - Yes
    - No
24. Do you contribute to a Political Action Committee?
    - Yes: AAA
    - Yes: ASHA
    - Yes: AAA and ASHA
    - No
25. In your opinion, which service provision is the most valued in humanitarian projects?
    - Providing amplification
    - Training local service providers
    - Infant hearing screening
    - Diagnostic testing
    - Referring to physician if pathology is identified
26. Is it reasonable to provide amplification in developing countries without audiology follow-up services or accessible supplies?
    - Yes
    - No

APPENDIX B

Recruiting Email

We invite you to participate in the Capstone Project, "Current Perspectives on Humanitarian Hearing Healthcare: A Survey of US Audiologists" being conducted by investigators from Washington University in St. Louis. The survey will assess the current status of humanitarian audiology and how audiologists and students alike can become more involved in humanitarian projects. The intention of the survey is to demonstrate the level of active and/or interested humanitarian audiologists, the barriers preventing audiologists from volunteering their services, and topics within humanitarian audiology needing further investigation.

If you agree to participate, we would like you to complete the survey with your present level of humanitarian experience. You are free to skip any questions that you prefer not to answer. The survey will be open for three weeks and will take approximately ten minutes to complete.

We will not collect your name or any identifying information about you. It will not be possible to link you to your responses on the survey.

Taking part in this research study is completely voluntary. You may choose not to take part at all. If you decide to be in this study, you may stop participating at any time. Any data that was collected as part of your participation in the study will remain as part of the study records and cannot be removed.

If you do not wish to participate in this study or want to end your participation in the study, simply return the survey without answering any or all of the questions. You will not be penalized or lose any benefits for which you otherwise qualify.

We encourage you to ask questions. If you have any questions about the research study itself, please contact: Rachael M. Kingma Queen at kingmaqueenr@wusm.wustl.edu. If you have questions, concerns, or complaints about your rights as a research participant, please contact the Human Research Protection Office at 660 South Euclid Avenue, Campus Box 8089, St. Louis, MO 63110, 1-(800)-438-0445 or email hrpo@wusm.wustl.edu. General information about being a research participant can be found on the Human Research Protection Office web site, http://hrpohome.wustl.edu. To offer input about your experiences as a research participant or to speak to someone other than the research staff, call the Human Research Protection Office at the number above.

Thank you very much for your consideration of this research study.